Name: _____ Class time: _____

# Geology 1 Exercise: Measurement, Maps, Latitude & Longitude

Objective: to gain insight into quantitative observations, measurements, and map interpretation.

## Precision vs. Accuracy:

**Accuracy** is the correctness of a measured value; how close it is to the actual value. **Precision** is the exactness of a measurement. Precision is usually described by the number of *significant digits*, that is, the number of digits left of the zeros. The number **3**000 has one significant digit, **324**0 has three, and 1.2312 has five (the trailing zero is not written) . More significant digits mean greater precision. Greater precision does not always mean greater accuracy, however. For example: the statement "You have 8.342 toes" is very precise (four significant digits) but not very accurate. "You have 10 toes" is more accurate but less precise.

1. Circle the most **precise** number: 654.0 654.3 654.32

2. Circle the most **accurate** answer: 8 ÷ 11 = 0.7277 0.7272 0.7273

## Measurement:


3. Make the following measurements to a precision of 2 significant digits (note the units!):

   a. What is the length of A-B in millimeters? _____ mm

   b. What is the length of A-B in centimeters? _____ cm

   c. What is the length of A-C in meters? _____ m

4. Find something **permanent** on your hands that is 1cm in length or width (e.g. width of a fingernail, from one crease to another. Not the length of a nail.). What is it? (Be specific!)

   _____

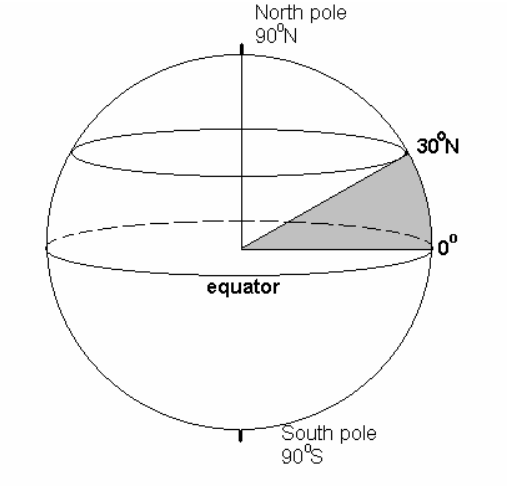
5. Using any method you choose, determine your height in both meters and cm to a precision of one hundredth (0.01) of a meter. _____ m and in centimeters _____ cm

6.) Measure the dimensions of the classroom to the nearest 0.1 meter.

   Length _____m, Width _____m, Height _____m

   Now calculate: Area _____m Volume _____m

## LATITUDE AND LONGITUDE:



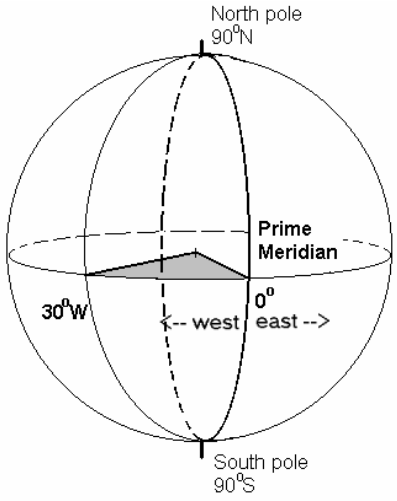

**Latitude** is the angular distance, north and south, measured from the *equator*. It is always measured in degrees. You must always specify "N" or "S" to indicate whether the latitude is north or south of the equator.

7. The maximum possible value of latitude is _____

What is the latitude of the equator? _____

8. How many degrees of latitude separate the north and

south poles? _____




**Longitude** is the angular distance, east and west, measured from an arbitrary reference line called the *Prime Meridian*.

Through which world capital does it pass? _____
You must always specify "E" or "W" to indicate whether a longitude is east or west of the Prime Meridian.

9. The maximum possible value of longitude is _____

10. Using a globe or map determine the latitude and longitude of Pasadena to the nearest degree.

Latitude = _____ Longitude = _____

## MAP PROJECTIONS:

11. Using a length of string and a **flat world map,** find the shortest path from Caracas, Venezuela to Tokyo, Japan. What is the land nearest to the halfway point?

_____

Now, do the same thing to find the shortest path on a **globe**. What is the land nearest to the halfway point?

_____

Explain why the paths are different. ("One's flat and one's round" is NOT an answer.)

_____

_____

Which is more accurate? _____

**MAP SCALE:** (use the ***Long Beach*** **map sheet**, found in the drawers on the side of the room, for the following questions)

Scale describes how much smaller (or larger) a model, like a map or globe, is then the real thing it represents. For example, if a model is 10,000 times smaller then the thing it represents, the scale is 1:10,000 (pronounced *"one to ten thousand"*). Scale is always a ratio of *one* to some number. For a map, 1:10,000 would mean that 1 cm on the map represents 10,000 cm on the ground.

12) What is the scale of this map? _____

13) On this map, how many cm's on the ground are represented by 1 cm on the map?

_____ How many km's? _____

14) How far a swim is it from Long Pt. on Catalina Is. to Pt. Fermin? _____km

and _____ miles and _____ nautical miles.

## MORE LATITUDE AND LONGITUDE:

15) What is the *latitude* of the north edge of the map? _____

What is the *longitude* of the east edge of the map? _____

16) What feature is at 33° 28'N, 119° 02'W? _____
(1° of latitude or longitude is subdivided into 60' [60 “minutes of arc”]).

17) What is the latitude and longitude of Begg Rock, to the nearest minute? You will need to "interpolate" to arrive at the minutes. (Hints: one nautical mile equals one minute of arc; always write latitude first, always include N or S with latitude and E or W with longitude.)

_____

18) The blackboard is on which wall of the classroom? **north south east west**